SANDIA LABNEWS
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Mail Services team delivers results **Page 5**

FIELD WORK — An unmanned aircraft system tracks and follows Sandia researcher David Novick, who is leading the MARCUS project at the Labs to identify, track and capture enemy UAS during flight.

Identify, track, capture

Sandia receives funding for three-year project to address UAS threats

*By **Manette Newbold Fisher***
*Photos by **Randy Montoya***

Sandia robotics experts are working on a way to intercept enemy unmanned aircraft systems midflight. They successfully tested their concept indoors with a swarm of four unmanned aircraft systems that flew in unison, each carrying one corner of a net. Acting as a team, the four units intercepted the flying target, trapped it in air like an insect caught in a web and safely lowered it to the ground.

The test was part of a two-year Laboratory Directed Research and Development project called Aerial Suppression of Airborne Platforms. The demonstration led to funding for three years of continued research and testing for the Mobile Adaptive/Reactive Counter Unmanned System, or MARCUS, project, which will address current and future national security threats posed by small unmanned aircraft systems.

"This is the future of security and incident response," said Jon Salton, manager of the Sandia team working on MARCUS. "Think of this as drone-against-drone. What we need to accomplish is combining ground- and aerial-based capabilities to more robustly address the UAS threat into the future."

The government and defense industry have been exploring ways to intercept enemy unmanned aircraft systems, with some organizations having success in deploying nets toward targets from single drones. Sandia's research built upon swarm coordination and carrying nets as a team.

The swarm of counter unmanned aircraft systems in Sandia's 2017 Aerial Suppression of Airborne Platforms demonstration was controlled by a ground-based computer system, project lead David Novick said.

"The computer system knows where each aircraft is at any given time and sends commands that space and move the system as a whole, appropriately," he said. This is what enables the aircraft to optimize its position for intercepting target aircraft systems.

MARCUS takes off from past research

Sandia developed algorithms for airborne mobile defense systems during the 2017 aerial suppression project because ground systems have limitations, Jon said. For example, ground-based radar has difficulty identifying low-altitude threatening vehicles through buildings and trees.

— CONTINUED ON PAGE 6

Biomanufacturing innovation

*By **Paul Rhien***

Sandia scientists joined other DOE national laboratories to showcase their bioscience research and capabilities before investors, industry representatives and university partners at the Innovation XLab: Biomanufacturing Summit at the California Memorial Stadium in Berkeley, Jan. 28-29. The two-day summit, hosted by Lawrence Berkeley National Laboratory, was designed to help bridge the gap between research and commercialization.

Senior Manager Mary Monson, who specializes in technology partnerships and business development, was on hand to visit with conference attendees in the exhibit hall and discuss opportunities to collaborate with Sandia.

"The Innovation XLab summit provided us with an important opportunity to exchange insights and ideas with potential collaborative research partners," Mary said. "Sandia has a robust intellectual property portfolio in the biosciences, and XLab gave us a chance to put Sandia's facilities, technologies and expertise on full display."

Anup Singh, chemical, biological, radiological, nuclear defense and energy technologies director, added that familiarizing industry participants with the broad spectrum of Sandia's research capabilities is the first step to creating important new partnerships.

— CONTINUED ON PAGE 7

SHOWCASING BIOSCIENCE — Sandia bioscience research and collaboration opportunities were on display at the January 2020 Innovation XLab: Biomanufacturing Summit in California. Representing Sandia at the event were, from left, Joel Sikora, Mary Monson, Paul Bryan, Anup Singh, Seema Singh and John Gladden. **Photo courtesy of Mary Monson**

VoIP technology upgrades complete

Multi-year project achieves goal to strengthen and modernize Labs phone system

By ***Sheina MacCormic***

LIGHTS OUT — Chief Information Officer Carol Jones, center right, flipped the switch on the 5ESS servers, decommissioning the Labs' outdated phone system at a Jan. 29 ceremony. From left, Glen Roybal, retiree Pat Manke, John Eldridge, Scott Stephens and Troy Holley joined Carol for the ceremony. The new VoIP system uses less than a fifth of the space required by the previous system. **Photo by Bret Latter**

As 2019 took its final bow, so did Sandia's 1980s-era telephone system, the 5ESS. A multi-year project to strengthen and modernize Sandia's phone system using Voice over Internet Protocol technology has improved Sandia's information technology infrastructure across all sites.

Completed ahead of schedule, this modernization effort required more than $10 million in new phone equipment, thousands of labor hours, miles of cable installation and more than 18,000 network endpoints, including telephones, servers and gateways. Now all Sandia locations across the country are under a single telephone switch, reducing heterogeneity across the sites, bringing Sandia into compliance with DOE orders and supporting Chief Information Officer Carol Jones' strategic goals.

Bringing VoIP technology to Sandia strengthens security and scalability, said Glen Roybal, a solutions architect with the telecommunications and infrastructure team. "It moves Sandia off an unsupported, end-of-life, 20-plus-year-old telephone system. It reduces the risk for adversaries to hack into our phone system and listen in on sensitive conversations," he said.

"It also provides unified communications. The move to VoIP technology allows the telephone to become part of the mix of integrating with other communication applications."

The new VoIP system also provides improved functionality for employees. When moving to a new office, employees can reassign their own office phone number from one VoIP phone to another without having to call in a ticket. Call appearance is now shared across the Labs, and call center features are now available at all sites.

Old system decommissioned

With the new switches and equipment in place and in use, Carol "turned out the lights" on the 5ESS servers, decommissioning the old system at a Jan. 29 ceremony.

"Modernizing our architecture is important in safeguarding Sandia's information," she said. Flipping the switch, she added, "And it's great to be able to shut down something old and outdated."

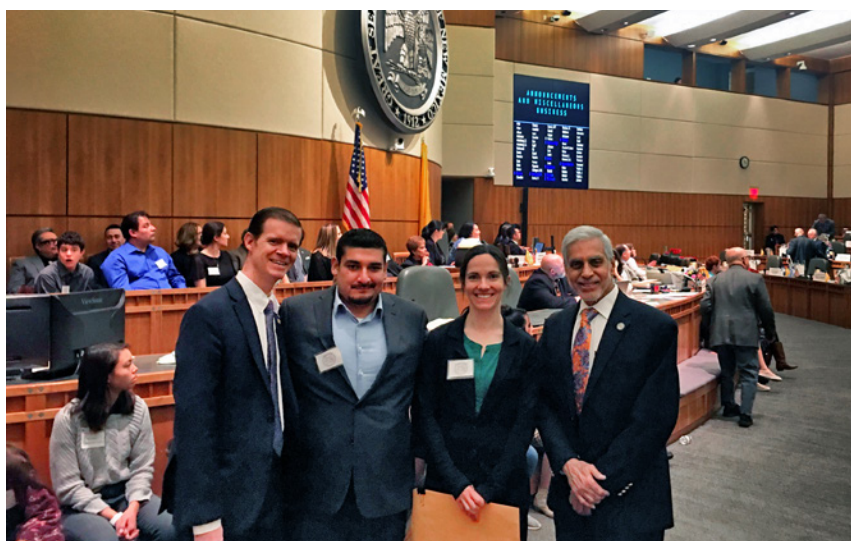
NM Legislature honors Sandia researchers

Two Sandia researchers were honored for their research and presented with certificates on the floor of the New Mexico House of Representatives Feb. 17.

Katya Casper was recognized "for her impressive expertise in wind tunnel applications in support of Sandia National Laboratories' programs." Vincent Urias was recognized "for his valuable research and contributions to cyber defense programs."

The awards, signed by House speaker Brian Egolf, were proposed by Rep. Abbas Akhil, a former Sandian.

"I really commend Rep. Akhil's thoughts of recognizing both Los Alamos and Sandia national laboratories," Vincent said. "Humanizing the labs by providing both a face and set of accomplishments to the state legislature is a great service. We have so many things we do well (at Sandia and LANL) but direct exposure is not one," he said. — Neal Singer



RESEARCH HONORS — From left, Rep. Jason Harper, Sandia researchers Vince Urias and Katya Casper and Rep. Abbas Akhil stopped for a photo after Vince and Katya were awarded certificates from the New Mexico House of Representatives, honoring them for their research. **Photo by Mason Martinez**

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LAB NEWS ONLINE: sandia.gov/LabNews

LABNEWS Notes

EDITOR'S NOTE: Lab News welcomes guest columnists who wish to tell their own "Sandia story" or offer their observations on life at the Labs or on science and technology in the news. If you have a column (500-800 words) or an idea to submit, contact Lab News Editor Tim Deshler at tadeshl@sandia.gov.

The Atomic Mr. Basie

Sandia Jazz Orchestra debuts at Steve Schiff Auditorium

Photos by ***Randy Montoya***

The Sandia Jazz Orchestra performed its inaugural concert, The Atomic Mr. Basie, before an enthusiastic crowd of jazz fans at the Steve Schiff Auditorium Feb. 20. The evening event, open to all with Kirtland Air Force Base access, featured big band music from the Grammy-winning 1958 album by the same name.

Launched in October 2019, the SJO is part of the Sandia Bands Association, the newest social association sponsored by the Sandia Employee Recreation Program.

Colin Milhaupt, who directs the 15-member band, said they are planning a few more concerts throughout the year. The band consists of Sandians from just about every division of the Labs playing music from the Big Band era to modern day, and they're looking to grow.

"It's been a lot of fun to put together," Colin said. "The mission is to provide opportunities to Sandians who want to continue to be involved with music. It would be great to start giving a few concerts off base as well."

The Sandia Bands Association hopes eventually to expand its offerings to include several different types of music ensembles.

"We're always looking for opportunities to increase community interaction," Colin said.

The SJO rehearses every Monday, 6-8 p.m., in the Steve Schiff lobby. Employees who are interested in learning more about the SJO or the Sandia Bands Association can contact the SERP office at serp@sandia.gov.

Super STEM Saturday

STEM SUPERHEROES — Sandia volunteers spent the day leading demonstrations to get kids excited about careers in STEM during Super STEM Saturday — the largest annual event of its kind in New Mexico — at the Albuquerque Convention Center Feb. 22. Elijah Hammond (left photo), Tommy Goolsby (center photo) and Chad Monthan (right photo) staffed the Sandia booth, showcasing access-delay methods and technologies, like sticky foam, developed at the Labs. The event also included performances by "Science Bob" Plugfelder. **Photos by Amy Tapia**

Tammy Kolda named ACM Fellow

Honored for 'contributions to data science'

By ***Michael Ellis Langley***

Sandia mathematician Tammy Kolda has been elected Fellow of the Association for Computing Machinery. She earned the honor for her "innovations in algorithms for tensor decompositions, contributions to data science and community leadership."

Tammy, who has a doctorate in mathematics, works in extreme-scale data science and analytics at Sandia. Her current research focuses on tensor decomposition for unsupervised machine learning and artificial intelligence.

ACM fellows represent the best in their field and the top 1% of the association's global membership. In their announcement, ACM wrote that Tammy played a central role in the creation, maturation and popularization of a powerful class of data analytic tools: tensor decomposition methods.

Tammy was among the first to recognize the importance of these techniques, and her mathematical, algorithmic and software contributions have been foundational to the development of this burgeoning field.

Tammy's contributions in other technical areas were also recognized, including her work in network science and nonlinear optimization, development of scientific software and her role as co-developer and founding Editor-in-Chief for the SIAM Journal on Mathematics of Data Science.

TENSOR DECOMP INNOVATOR — Sandia mathematician Tammy Kolda has been elected Fellow of the Association for Computing Machinery.
Photo courtesy of Tammy Kolda

Oppenheimer Fellows visit Sandia

Fellows of the Oppenheimer Science and Energy Leadership Program cohort 4 visited Sandia's Albuquerque campus Jan. 30-31 to learn about the Labs' technologies, capabilities and programs supporting government agencies. Sandian Sarah Allendorf, director of chemistry, combustion and materials science, is a member of this year's cohort.

The two-day event included discussions with Labs Director James S. Peery and other leaders, briefings on technologies and programs supporting the Labs' national security mission and tours of Sandia facilities. The cohort also visited the National Museum of Nuclear Science and History and participated in a panel discussion with the NNSA Sandia Field Office.

OSELP is a leadership development program sponsored by the National Laboratory Directors' Council. Since the program's inception in 2016, each cohort of OSELP Fellows has participated in a year-long series of visits to national laboratories and Washington, D.C., to gain leadership skills and learn about the full spectrum of DOE missions and operations.

OSELP Fellows meet distinguished leaders and innovators in science and energy and witness federal policymaking, gaining an understanding of how policies are made within the wider scientific ecosystem.

OPPENHEIMER FELLOWS — Fellows of the Oppenheimer Science and Energy Leadership Program cohort 4 met with Labs leaders during a visit to Sandia's Albuquerque campus Jan. 30-31. The fellows visited the site to learn about Sandia's technologies, capabilities and programs supporting government agencies. **Photo by Lonnie Anderson**

DOE Under Secretary Dabbar visits Sandia

FUELING RESEARCH — Sandia researcher Chuck Mueller, left, briefs DOE Under Secretary for Science Paul M. Dabbar on ducted fuel injection during Dabbar's Jan. 29 visit to Sandia/California.

By ***Michael Ellis Langley***
Photos by ***Randy Wong***

DOE Under Secretary for Science Paul M. Dabbar and Deputy Under Secretary Thomas Cubbage visited Sandia/California Jan. 29 to meet with Integrated Security Solutions Associate Labs Director Andy McIlroy and other senior leaders and researchers. Their visit included a tour of Sandia's Combustion Research Facility and briefings on the Labs' cutting-edge technology development.

During the visit, Dabbar met with engines and fuels researcher Chuck Mueller to discuss ducted fuel injection, a technology, developed under Chuck's leadership, that has garnered the attention of the automotive industry.

Dabbar leads technology commercialization activities for DOE and the 17 DOE national laboratories, including Sandia.

DABBAR WELCOME — DOE Under Secretary for Science Paul M. Dabbar, center right, met with Associate Labs Director Andy McIlroy, center left, and other Labs leaders and researchers during his Jan. 29 visit to Sandia/California.

Mail Services team delivers results

Sandia mail carriers Bob Locher, left, and Evangelina Coch get an early morning start, bringing in the day's first batch of mail from the U.S. Post Office.

Story and photos by ***Randy Montoya***

Receiving mail is still a special feeling left over from childhood, an acknowledgment of our existence, but do we ever stop to think about all that occurs between the moments when someone sends us something and we receive it? Sandia's Mail Services team knows first-hand.

In fiscal year 2019, the four members of Sandia's Albuquerque Mail Services team picked up and delivered nearly 100,000 pieces of mail to 13,000 staff members across 118 buildings with 517 mailstops. The year's incoming and internal mail weighed a total of 98,789 lbs. That total doesn't include the many donations for the Labs' book and school supplies drives or the 7,158 lbs. of recycled paper the team picked up.

"This is a very tight group of motivated people," said Daniel Sanchez, team lead for logistics operations at the Albuquerque campus. "They are committed to their part in Sandia's mission regardless of the weather conditions. Not only do we deliver to all areas on base, we deliver to CINT (Center for Integrated Nanotechnologies), Research Park, the Advanced Materials Lab by UNM and the two newest buildings, Surge/Buena Vista and Lovelace Gibson."

Angela Jojola begins the mail sorting process.

Official Sandia mail awaits its final destination.

Heather Barnard readies postage labels.

Evangelina Coch brings in the last mail shipment of the day for sorting.

From left, mail carriers Ellen Homan, Bob Locher, Angela Jojola and Evangelina Coch deliver and pick up all of the mail at Sandia's Albuquerque campus.

MARCUS

CONTINUED FROM PAGE 1

Airborne systems with sensors could dramatically enhance the ability to mitigate threats, even as the technology continues to evolve, he said. The idea of MARCUS is that the unmanned aircraft systems would have the ability to intercept small threats and keep them at a safe distance from protected facilities and people.

MARCUS project research encompasses three phases: identify, track and capture. David said in the identification phase, sensors on unmanned aircraft systems will combine with ground-based systems to scan the environment. Computer systems will use this information to detect unmanned aircraft systems that pose a threat.

Additional unmanned aircraft systems could be deployed to track and assess a threat vehicle, gather information and predict future movements, David said. If the threatening unmanned aircraft systems were captured, they would be taken to a safe location, away from the public or response personnel.

Uncharted territory

Researchers face the challenge of developing a system that has never been created before, said David. If the project is successful, multiple agencies could benefit from the technology, including the military, the Department of Homeland Security, law enforcement entities and event organizers.

The MARCUS project is led by Sandia in collaboration with Rafael Fierro, a professor in the Department of Electrical and Computer Engineering at The University of New Mexico.

The project is funded by the NATO Science for Peace and Security Programme, and incorporates advanced algorithms funded by the Department of Homeland Security Science and Technology Directorate. The work is being performed in partnership with armasuisse Science and Technology of the Swiss Federal Department of Defense, Civil Protection and Sport.

AIRBORNE DEFENSE — Researchers leading the MARCUS project are working to develop a system that addresses current and future national security threats posed by small unmanned aircraft systems.

COUNTERING UAS — From left, Camron Kouhestani flies an unmanned aircraft system while Jaclynn Stubbs and Bryana Woo monitor a camera stream. Some Sandia UAS research involves using a swarm of drones to track and capture enemy aircraft systems in flight.

SANDIA CLASSIFIED ADS

***NOTE:** The classified ad deadline for the March 13 Lab News is noon Friday, March 6.*

AD SUBMISSION GUIDELINES

AD SUBMISSION DEADLINE: Friday noon before the week of publication unless changed by holiday.

Questions to Michelle Fleming at 505-844-4902.

Submit by one of the following methods:

- **EMAIL:** Michelle Fleming (classads@sandia.gov)
- **FAX:** 505-844-0645
- **MAIL:** MS1468 (Dept. 3651)
- **INTERNAL WEB:** Click on the News Tab at the top of the Techweb homepage. At the bottom of the NewsCenter page, click the **"Submit a Classified Ad"** button and complete the form.

Due to space constraints, ads will be printed on a first-come, first-served basis.

MISCELLANEOUS

AMISH DINING SET, solid oak, w/6 Windsor chairs, lighted china cabinet, tinyurl.com/wyqou6n. Moonka, ajoy@moonka.com.

BABY ITEMS: Evenflo green plaid stroller; 2 pink car seats, never wrecked; $20 ea. OBO. Lauben, 505-980-2915.

POWER RECLINER, loveseat, 1773 Flexsteele, mahogany leather, console lumbar/head adjust, immaculate, only 3 mos. old, moving, paid $2,900, asking $1,800. Sanchez, 505-974-1655.

FULL-SIZE BED, mattress & bedding, immaculate set, used in spare guest bdr., call for photos, $300 firm. Sanchez, 505-897-4514.

RECLINING COUCH, seats 3, $180 OBO. Jones, 505-306-7412.

MINI REFRIGERATOR, perfect for small office, does not have freezer, 16.4" x 15.2" x 13.2", $125. McDonald, 907-830-4938.

ELECTRIC TYPEWRITER, vintage, Smith Corona DeVille 410, w/table, $50. Colgan, 505-344-3776.

ADJUSTABLE BED BASE, queen, brand new, Sealy Ease, brackets for headboard, warranty, $750. Gutierrez, 505-900-8944.

FORD PLATINUM WHEELS, 20-in., $400; subwoofer, 18-in., custom, $200; BRX taillight, $40. Novak, 505-205-5884.

VINTAGE TOOLS: DeWalt Power Shop, radial arm saw, $200 OBO; Craftsman floor model band saw, $25; photos available. Graham, 505-259-1840.

TRANSPORTATION

'94 JEEP WRANGLER SAHARA, 6-cyl., fuel injected, manual transmission, new clutch, runs great, $6,800. McNeill, 505-639-9098.

'15 HYUNDAI SE, sedan, 2.4L engine, FWD, silver blue, 23K miles, Carfax report, excellent condition, $12,950. Hibray, 505-306-6364 or dhibrary@comcast.net.

'15 DODGE GRAND CARAVAN SXT, seats 7, Stow N' Go seating, tow ready, 89K miles, great condition, $9,850. Higgins, 620-282-1462.

'03 TOYOTA CELICA, 1 owner, 164K miles, very good condition, $3,000. Sanchez, 505-720-2340.

'14 BMW X6, 4WD/AWD, premium pkg., premium run flat tire (new), 72K miles, $26,500. Geubelle, mgeubelle@aol.com.

'00 EXPEDITION EDDIE BAUER, 4x4, leather seats, 3rd-row seat, body & interior in excellent condition, 175K miles, tires very good. Grenfell, 505-620-5745.

RECREATION

ROAD BIKE, Classic Bertin, circa 1980, many rare French-made components, tall frame for 6-ft.+, call/email for photos, $500 OBO. Weber, 505-553-2118 or tmweber77@gmail.com.

'02 LANCE LITE 915, long bed truck camper, electric jacks, full kitchen/bath, excellent condition, $9,000. Tullai, 505-363-3026, ask for Mike.

'10 HONDA SABRE 1300, 14K miles, excellent condition, $4,500 OBO. Meyer, 505-263-2766, ask for Todd.

'20 COACHMAN BEYOND, 22-ft., lithium battery, touring vehicle, sleeps 2, all options, 8.8K miles, $109,500. Campbell, 505-620-5369.

CABOVER CASCADE CAMPER, 8-ft. bed, propane stove, refrigerator, heater, needs new roof vent, go fishing, $1,500. Marron, 505-345-4006.

AD RULES

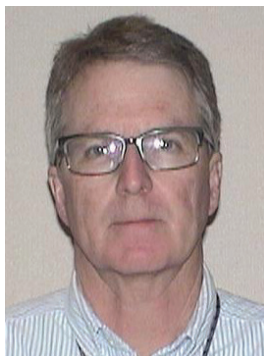
1. Limit 18 words, including last name and home phone (web or email address counts as two or three words, depending on length).
2. Include organization and full name with ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. The same ad may not run more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce and retired Sandians only.
10. Housing listed for sale is available without regard to race, creed, color or national origin.
11. Work wanted ads are limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in poor taste.

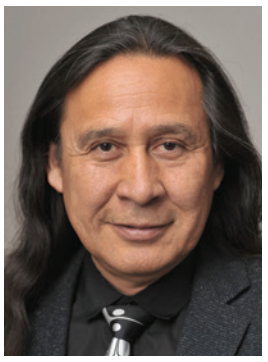
Mileposts

New Mexico photos by Michelle Fleming
California photos by Randy Wong


Kurt Wessendorf 40


Randy Harrison 35


David Hendrick 35


Laurence Brown 30


Greg Madrid 30


Robert Pierce 30


Steve Rice 30


Lynne Felix 25

Recent Retirees

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Larry Dishman 46


Kyle Hayden 25


Larry Kincaid 25


Andy Salinger 25


Christopher Kershaw 20

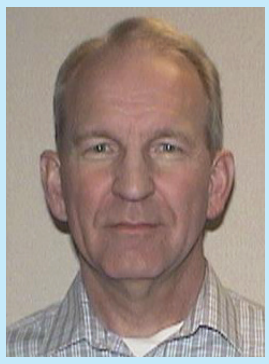

Russell Skocypec 35 Lisa Trainor-Skocypec 24


Isaac Toledo 20


Tracy Armijo 15


David Bravo 15


Carrie Burchard 15


Brett Remund 31


Paul Smith 28


Jennifer Dellinger 15


Lesley Drain 15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Wendy Crenshaw 20


Mark Naro 17

Biomanufacturing

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"Sandia is doing groundbreaking work in synthetic biology, biofuels, algae, biosecurity, agriculture and biomass deconstruction," Anup said. "Transitioning these scientific discoveries and technologies developed at Sandia to the marketplace accelerates innovation."

Biological solutions

Sandia's dynamic biological research capability addresses important national security challenges. Research in two strategic areas — biomass conversion and biodefense — provides biological solutions to critical challenges in energy, environment and homeland security.

The conference agenda covered numerous topics, including ethics, profitability, automation and artificial intelligence, as well as the future roles of biomanufacturing and synthetic biology in food production and agriculture, biofuels and transportation, bio-based materials and therapeutics.

The event was the fifth in the DOE's Innovation XLab series. Past events have covered a variety of topics, including energy storage, grid modernization, advanced manufacturing and artificial intelligence.

Image courtesy of Lawrence Berkeley National Laboratory

Postdoc Technical Showcase

Annual event connects postdocs and leaders, recognizes mentors

Sandia's Albuquerque campus hosted its 2019 Postdoctoral Technical Showcase at the National Museum of Nuclear Science and History in December. The annual event brings together early-career postdoctoral scientists and engineers with Labs' leaders and decision makers for a technical poster competition and mentor awards.

The showcase, sponsored by the Sandia Postdoctoral Development Board, offers postdocs a venue to demonstrate their work and find opportunities to advance their careers. Sandia currently has 258 postdoctoral employees in New Mexico and California.

The event featured 46 posters, including 15 from Los Alamos National Laboratory postdocs, who have been invited to participate in the annual Sandia event since 2015. The posters are judged on four criteria: scientific content, poster presentation, research complexity and oral presentation.

Martha Gross earned first place in the contest with her poster, "Interfacial Engineering in Sodium Batteries." Runners-up were Mary Alice Cusentino for "Machine Learned Interatomic Potentials for Studying Plasma Material Interactions" and LANL postdoc Alejandra Londoño-Calderon for "Crystallographic Orientation of 1D & 2D Tellurium from 4D Scanning Transmission Electron Microscopy."

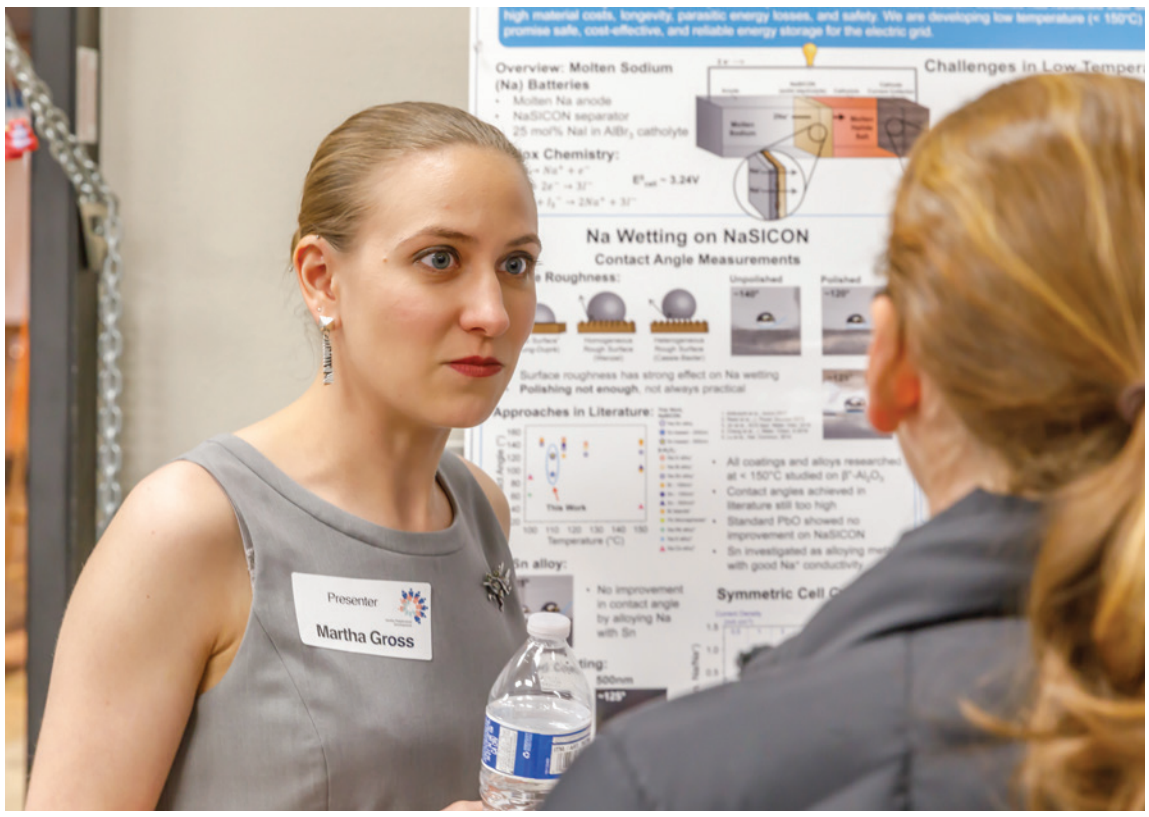
In addition to the poster submissions, postdoctoral employees were invited to nominate their mentors, advisors or managers for a Distinguished Mentor Award by submitting a short essay describing how the nominee models Sandia's priorities to ensure that postdocs have the best experience possible and are prepared for their next career move.

A record 12 mentors from New Mexico and nine from California were nominated for the award, marking the first time the pool was large enough to warrant a winner at each site.

New Mexico Distinguished Mentor Anne Ruffing earned her award for encouraging her student to apply for a grant on a research idea and working off the clock on weekends to help get the project funded.

California Distinguished Mentor Isaac Ekoto earned the title for easing the complications associated with being a Foreign National postdoc and fostering a research-focused academic publishing route for his nominator.

Former Labs Director Steve Younger presented certificates to the winners of the poster competition and mentor awards during the showcase.



TOP TECH — Martha Gross presents her first-place winning poster, "Interfacial Engineering in Sodium Batteries," during the 2019 Postdoctoral Technical Showcase. **Photo by Bret Latter**

FUNDING CHAMP — Former Labs Director Steve Younger, left, presents Anne Ruffing with the Distinguished Mentor Award for New Mexico. **Photo by Bret Latter**

RESEARCH FOCUS — From left, Paul Miles stands with California Distinguished Mentor Isaac Ekoto, nominator Sayan Biswas and Christopher Moen. **Photo by Randy Wong**